

WG#4: Revolutionary Approaches to High-End Computing

# Challenges

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- **Memory**
- **Communication**
- **Programmability / Efficiency**
- **Power**
- **System Robustness**

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# **Novel Approaches**

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- **PIM--Processor Integrated Memory**
- **Choreography of data and computation**
- **Wires first (communication-centric)**

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## **Without This Research**

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- **Microprocessor performance stagnates**
- **Multiprocessor growth is driven only by commodity microprocessors**
- **Relative latency increases and harder to use coarse granularity**
- **SW is impossible to afford**
- **No new computing models**

1996 DARPA ITO General PI Meeting, Dallas, TX

## WG#4: Revolutionary Approaches to High-End Computing

# With This Research

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- **High-end computing available**
- **High-end systems easily usable**
- **Impact commodity & embedded**
- **Enable applications**
- **Exponential performance increase**

# **Investment Strategy**

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- **Industry is evolutionary only (desktop focus)**
- **Collaborations**
  - DOD, DOE, NSA, NSF etc have problems
- **Mixed Scale of Efforts**
  - Building Stuff (academics)
  - Integrated HW/SW projects
  - Industry and university collaborations

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## **Other Issues Addressed**

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- **Rethink OS/Systems SW at the same time (e.g. VM)**
- **Algorithm, modeling**
- **Greater architecture independence, portability, and adaptability**